Chapter 16 – Carbohydrate Metabolism II

- Know which enzymes are shared by glycolysis and gluconeogenesis, and which are unique to each pathway
- Know which molecules can be used as substrates for gluconeogenesis
- Understand how glycolysis and gluconeogenesis are reciprocally regulated, and specifically how the hormone glucagon activates gluconeogenesis while inhibiting glycolysis
- In the same light, understand the role of fructose-2,6-bisphosphate in the regulation of glycolysis and gluconeogenesis
- Know the process and regulation of glycogen synthesis
- Understand how glucagon and epinephrine regulate glycogen synthesis and breakdown
- Know the difference between N-linked and O-linked polysaccharides, and how the two are synthesized
- Understand how a bacterial cell wall is assembled, and how the process is inhibited by penicillin and vancomycin

Chapter 18 – Lipid Metabolism I

- Understand the functional and structural differences between the different lipoproteins
- Know the differences between triglyceride and cholesterol transport
- Know how fat is mobilized in adipose tissue for distribution to the rest of the body in times of fasting
- Know the process and enzymes associated with fatty acid β-oxidation
- Know how fatty acid β-oxidation is modified with unsaturated fatty acids
- Know how ketone bodies are produced and consumed, and why the liver is unable to utilize ketone bodies for energy
- Know how the fatty acid palmitic acid is synthesized from acetyl-CoA in the liver
- Know how palmitic acid is unsaturated and elongated
- Know the difference between an essential and a non-essential fatty acid
Chapter 19 – Lipid Metabolism II

- Know how the common phospholipids are synthesized in eukaryotic cells
- Know the products of the reaction of phospholipases.
- Know the structure of a plasmalogen
- Know how sphingolipids are synthesized
- Know how mevalonate is synthesized from acetyl-CoA
- Know how the enzyme HMG-CoA reductase is an important clinical target in hypercholesterolemia
- Know the general structure and function of molecules synthesized from cholesterol.
- Know how eicosanoids are synthesized from arachidonic acid
- Know the importance of cyclooxygenase (COX) and phospholipase A2 as clinical targets for pain.

Chapter 20 – Metabolism of nitrogenous compounds

- Know the difference between a ketogenic and glucogenic amino acid
- Know the difference between essential and non-essential amino acids
- Know the cellular reactions that generate free ammonia
- Know the mechanism of the transamination reaction
- Know the urea cycle and how it is regulated
- Know how extrahepatic ammonia is transported to the liver
- Know the structure of tetrahydrofolate, its role in one carbon metabolic enzymes, and the clinical importance of dihydrofolate reductase inhibitors
- Understand the enzymatic reactions that require vitamin B12 as a cofactor

Chapter 21 – Amino acids, porphyrins, and neurotransmitters

- Understand the processes used to catabolize amino acids
- Know how nonessential amino acids are synthesized in eukaryotic cells
- Know how polyamines are synthesized from ornithine
- Know the reaction catalyzed by phenylalanine hydroxylase, the structure of the cofactor tetrahydrobiopterin, and the clinical importance of the reaction
• Know the processes of heme biosynthesis and degradation
• Know the neurotransmitters synthesized from amino acids and how they are made